

IN THE CLAIMS:

Please cancel Claims 29, 37, 38 and 47 to 61 without prejudice or disclaimer of subject matter.

Please amend the remaining claims, as follows:

1. (Original) A solid semiconductor element disposed in contact with a liquid, comprising:

information acquiring means for acquiring chemical property information of said liquid, including at least one of a hydrogen ion concentration index, a concentration, and a density of said liquid;

information communication means for displaying or transmitting the information acquired by said information acquiring means to the outside; and

energy converting means for converting an energy applied from the outside to an energy of a type different from the type of said applied energy to operate said information acquiring means and said information transmission means.

2. (Original) The solid semiconductor element according to claim 1, further comprising:

information storing means for storing information to be compared with said acquired information; and

discrimination means for comparing said acquired information with the corresponding information stored in said information storing means, and discriminating a need for transmission of the information to the outside,

wherein said information communicating means displays or transmits said acquired information to the outside, when said discrimination means discriminates the need for the information transmission, and

said information storing means and said discrimination means are operated by the energy converted by said energy converting means.

3. (Original) The solid semiconductor element according to claim 1, further comprising:

information storing means for storing the information to be compared with said acquired information;

receiving means for receiving a signal from the outside; and

discrimination means for allowing said information acquiring means to acquire the information about the liquid contained in said container in response to the signal received by said receiving means, comparing said acquired information with the corresponding information stored in said information storing means, and judging whether or not said acquired information meets a predetermined condition,

wherein said information communicating means displays or transmits at least a discrimination result obtained by said discrimination means to the outside, and

said information storing means, said receiving means, and said discrimination means are operated by the energy converted by said energy converting means.

4. (Original) The solid semiconductor element according to claim 1 wherein said energy converting means comprises an oscillation circuit for generating a

power by an induced electromotive force by electromagnetic induction with a resonance circuit disposed outside.

5. (Original) The solid semiconductor element according to claim 4 wherein the information about said liquid is given by a change of an output from said oscillation circuit.

6. (Currently Amended) The solid semiconductor element according to claim 1 which is in contact with the liquid by being floated and disposed on a liquid surface or in the liquid, and which has a hollow portion for floating on said liquid surface or in the liquid.

7. (Currently Amended) The solid semiconductor element according to claim 6 which is disposed in a container in contact with the liquid contained therein, and wherein said information acquiring means comprises means for detecting a residual amount of the liquid in said container.

8. (Original) The solid semiconductor element according to claim 1 wherein said information acquiring means comprises means for detecting an ion concentration of the liquid.

9. (Original) The solid semiconductor element according to claim 8, wherein said information acquiring means comprises an ion sensor.

10. (Original) The solid semiconductor element according to claim 8, wherein said information acquiring means comprises an ion selective field effect transistor.

11. (Original) An ink tank which contains an ink to be supplied to an ejection head for ejecting the ink, wherein at least one solid semiconductor element according to claim 1, is arranged in contact with the ink.

12. (Currently Amended)An ink tank according to claim 11, wherein said solid semiconductor element is in contact with the ink by being floated and disposed on an ink surface or in ~~an~~ the ink, and said information acquiring means comprises means for detecting an ink residual amount.

13. (Original) The ink tank according to claim 11, wherein said information acquiring means comprises means for detecting an ion concentration of the ink.

14. (Original) The ink tank according to claim 13, wherein said information acquiring means comprises an ion sensor.

15. (Original) The ink tank according to claim 13, wherein said information acquiring means comprises an ion selective field effect transistor.

16. (Currently Amended) An ink tank which contains an ink to be supplied to an ejection head for ejecting the ink, comprising an ink tank compartment which

contains the ink and a semiconductor element arranged in contact with the ink, wherein said semiconductor element comprises:

information acquiring means for acquiring chemical property information of said ink, including at least one of a hydrogen ion concentration index, a concentration, and a density of said ink;

information communicating means for displaying or transmitting the information acquired by said information acquiring means to the outside; and

energy converting means for converting an energy applied from the outside to an energy of a type different from the type of said applied energy to operate said information acquiring means and said information communicating means.

17. (Original) The ink tank according to claim 16, further comprising:

information storing means for storing information to be compared with said acquired information; and

discrimination means for comparing said acquired information with the corresponding information stored in said information storing means, and discriminating a need for transmission of the information to the outside,

wherein said information communicating means displays or transmits said acquired information to the outside, when said discrimination means discriminates the need for the information transmission, and

said information storing means and said discrimination means are operated by the energy converted by said energy converting means.

18. (Original) The ink tank according to claim 16, further comprising:

information storing means for storing the information to be compared with said acquired information;

receiving means for receiving a signal from the outside; and

discrimination means for allowing said information acquiring means to acquire the information about said ink in response to the signal received by said receiving means, comparing said acquired information with the corresponding information stored in said information storing means, and judging whether or not said acquired information meets a predetermined condition,

wherein said information communicating means displays or transmits at least a discrimination result obtained by said discrimination means to the outside, and

said information storing means, said receiving means, and said discrimination means are operated by the energy converted by said energy converting means.

19. (Original) The ink tank according to claim 16, wherein said energy converting means comprises an oscillation circuit for generating a power by an induced electromotive force by electromagnetic induction with a resonance circuit disposed outside.

20. (Original) The ink tank according to claim 19, wherein the information about said ink is given by a change of an output from said oscillation circuit.

21. (Original) An ink jet recording apparatus comprising: an ejection head for ejecting an ink; and the ink tank according to any one of claims 11 to 20, in which the ink to be supplied to said ejection head is contained.

22. (Original) A liquid change information acquiring method of using a solid semiconductor element disposed in contact with a liquid, said element comprising:  
information acquiring means for acquiring information about the liquid;  
information communicating means for displaying or transmitting the information acquired by said information acquiring means to the outside; and  
energy converting means for converting an energy applied from the outside to an energy of a type different from the type of said applied energy to operate said information acquiring means and said information communicating means.

23. (Original) The information acquiring method according to claim 22, wherein said information acquiring means acquires change information of a liquid chemical property Including at least one of a hydrogen ion concentration index, a concentration, and a density of the liquid.

24. (Currently Amended) A liquid physical property change discriminating method of using a solid semiconductor element disposed in contact with a liquid, the element comprising:  
information acquiring means for acquiring information about the liquid;  
discrimination means for discriminating a liquid physical property change based on the information acquired by said information acquiring means and a pre-stored data table;  
information communicating means for displaying or transmitting the information acquired by said discrimination means to the outside; and  
energy converting means for converting an energy applied from the outside to an energy of a type different from the type of said applied energy to operate said

information acquiring means, said discrimination means and said information communicating means;

wherein said method comprises using the solid semiconductor element to discriminate a property change in the liquid.

25. (Original) The discriminating method according to claim 24, wherein said information acquiring means acquires the change information of the chemical property of the liquid, estimates a change of a physical property value of the liquid from the change information of the chemical property of said liquid and said data table, and discriminates a need for information transmission.

26. (Original) The discriminating method according to claim 25, wherein the change information of the chemical property of said liquid includes at least one of a hydrogen ion concentration index, a concentration, and a density of the liquid.

27. (Original) The discriminating method according to claim 25, wherein the physical property of said liquid includes at least one of a viscosity, and a surface tension of the liquid.

28. (Original) The discriminating method according to claim 24, wherein said discrimination means compares the information acquired by said information acquiring means with said pre-stored data table, and discriminates the need for information transmission.

29. (Cancelled)



30. (Currently Amended) A solid semiconductor element in contact with liquid comprising:

receiving and energy converting means for receiving a signal of an electromagnetic wave from the outside of said solid semiconductor element in a non-contact manner, and converting the electromagnetic wave to a power by electromagnetic induction;

information acquiring means for acquiring outside environmental information concerning the liquid;

information storing means for storing information to be compared with the information acquired by said information acquiring means;

discrimination means for comparing the information acquired by said information acquiring means with the corresponding information stored in said information storing means, and discriminating a need for information transmission when the signal of the electromagnetic wave received by said receiving and energy converting means satisfies a predetermined response condition; and

information communicating means for displaying or transmitting the information acquired by said information acquiring means to the outside of said solid semiconductor element when said discrimination means discriminates the need for the information transmission,

wherein said information acquiring means, said information storing means, said discrimination means, and said information communicating means are operated by the power converted by said receiving and energy converting means.

31. (Original) The solid semiconductor element according to claim 30, wherein said response condition comprises an electromagnetic induction frequency.

32. (Original) The solid semiconductor element according to claim 30, wherein said response condition comprises a communication protocol.

33. (Original) The solid semiconductor element according to claim 30, wherein said information communicating means converts the power converted by said receiving and energy converting means to a magnetic field, a light, a shape, a color, a radio wave, or a sound as the energy for displaying or transmitting the information to said outside.

34. (Original) The solid semiconductor element according to claim 30, wherein said receiving and energy converting means comprises a conductor coil and an oscillation circuit for generating the power by electromagnetic induction with an outside resonance circuit.

35. (Original) The solid semiconductor element according to claim 34, wherein said conductor coil is formed to be wound around an outer surface of the solid semiconductor element.

36. (Original) The solid semiconductor element according to claim 30, comprising a hollow portion for floating on a liquid surface or in a predetermined position in the liquid.

37. and 38. (Cancelled)

39. (Currently Amended) An ink tank in which at least one of solid semiconductor elements according to any one of claims 30 to ~~38~~ 36 is disposed in contact with ink contained in the ink tank.

40. (Original) The ink tank according to claim 39, wherein a response condition of said solid semiconductor element differs with an ink in the tank.

41. (Original) The ink tank according to claim 40, wherein the response condition of said solid semiconductor element differs with an ink color in the tank.

42. (Original) The ink tank according to claim 40, wherein the response condition of said solid semiconductor element differs with a color material concentration of the ink in the tank.

43. (Original) The ink tank according to claim 40, wherein the response condition of said solid semiconductor element differs with an ink property of the ink in the tank.

44. (Original) An ink jet recording apparatus in which a plurality of ink tanks according to claim 39, are disposed.

45. (Original) The ink jet recording apparatus according to claim 44, further comprising communication means for transmitting/receiving an electromagnetic wave with respect to the solid semiconductor element in each ink tank.

46. (Original) The ink jet recording apparatus according to claim 45, wherein said communication means comprises a resonance circuit for emitting the electromagnetic wave.